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**Something From Nothing: How Cryptocurrency is Created and Monetized**

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**Something from Nothing**

**LESSON DESCRIPTION**

A simulation provides students with brief insight into how most digital or cryptocurrencies (used synonymously in this lesson) are “found” or “mined.” Students solve a few riddles or problems and are rewarded with some type of made-up currency described by the teacher. After a few rounds, students that have earned the currency get the option to “buy” something or exchange it for dollars, thus creating value. Through a series of prompts and questions, students gain a basic understanding of where cryptocurrencies come from, how they gain or lose value, and how they meet the traditional functions of money. The lesson concludes with students making their own case for why they would or would not be inclined to use digital currency.

This lesson assumes prior knowledge of the basic functions of money – unit of account, store of value, and medium of exchange. Furthermore, the teacher needs a basic understanding of how cryptocurrency is mined and used. The following articles and videos are recommended:

* Investopedia: [How does Bitcoin Mining Work](https://www.investopedia.com/tech/how-does-bitcoin-mining-work/)
* St. Louis Fed Page One: [Bitcoin: Money or Financial Investment](https://www.stlouisfed.org/education/page-one-economics-classroom-edition/bitcoin-money-or-financial-investment)
* Simply Explained: [How a blockchain works (optional, more advanced)](https://www.youtube.com/watch?v=SSo_EIwHSd4)

**ESSENTIAL QUESTIONS**

* Where do digital/crypto currencies like Bitcoin, Ethereum, Dogecoin, etc come from?
* How do digital currencies get their value?
* To what degree do cryptocurrencies achieve the basic functions of money?

**CONCEPTS**

* functions of money
* market value

**NATIONAL VOLUNTARY ECON CONTENT STANDARDS**

**Content Standard 11: Money and Inflation**

Money makes it easier to trade, borrow, save, invest, and compare the value of goods and services. The amount of money in the economy affects the overall price level. Inflation is an increase in the overall price level that reduces the value of money.

**GEORGIA STANDARDS OF EXCELLENCE**

**SSEMA2 Explain the role and functions of the Federal Reserve System.**

a. Explain the roles/functions of money as a medium of exchange, store of value, and unit of account/standard of value.

**GRADE LEVEL**

9-12

**TIME REQUIRED**

30-45 minutes

**MATERIALS**

* Some type of online record keeping ability that students can see (Google doc, displayed Word doc, etc). See **SAMPLE BLOCK CHAIN LEDGER** at the end of the lesson.
* A clock or timekeeping device
* **Activity 1: Questions for Currency Mining** - (One for teacher) \*This is optional, you may also choose to create your own questions.
* **Handout 1: Cryptocurrency Activity Debrief Sheet** (one per student, also available as a [google doc here](https://docs.google.com/document/d/1r727Dx4mWC37merP_BygOwox-rU-Dt67knLJe4L16xA/copy))
* **Handout 1: Answer Key** (one for teacher if needed for talking points)

**PROCEDURES**

1. Introduce the lesson by asking students to name any cryptocurrencies they have heard about through the news or social media. Write these on the board. *(Answers will vary, but will likely include Bitcoin, Dogecoin, Ethereum, etc.)* Once you have a list of a few, discuss several follow-up questions:
   1. What *is* a digital/crytpo currency? *(An online form of money where exchanges and transactions are recorded by a decentralized system rather than a central authority.)*
   2. How are cryptocurrencies different than “regular” or “fiat” money? *(Not “printed”, no one in control, no set value, not as accepted, etc. Importantly, these digital currencies are validated through something called a blockchain which you will roughly simulate shortly. This verification process is an important feature of cryptocurrency.)*
   3. Why do people want cryptocurrency? *(Investments, speculation, it’s hip and cool, to make certain purchases, etc)*
2. Explain that the class is now going to mine a new digital currency. Explain that you are going pose some riddles, trivia questions, and math equations and as students answer, they will be rewarded with [insert your name of currency]. (For this lesson plan, I’ll refer to the currency as EconCoin, but get creative!) Display your record keeping document. Explain that this is going to serve as your “blockchain” and will have a record of all the EconCoin activity.
3. Read the first question from **Activity 1: Questions for Currency Mining** (or your own question set) to the group. Have the students shout out the answer or put the answer in chat if doing this virtually. This simulates the “guessing” nature of real life computers throwing answers out.
4. When you hear the first correct answer, record the time of the correct answer, the student’s name, and the correct answer on the blockchain document and note the student has earned 10 EconCoin. Refer to the **Sample Block Chain LEDGER** found at the end of the lesson as an example.
5. Get very excited about the fact that the first student has just earned 10 EconCoin. Remember - they are the first person in the world to earn this currency! Use your best acting skills here. \*IMPORTANT – **DO NOT** give them any physical token of the currency. No fake money, no beans, no paper clips – nothing! Remember, it’s ALL digital. Discuss the following with the student:
   1. How do you feel about having this new currency? *(Answers will vary, but some aspect of confusion should be expected)*
   2. How do you know you have 10 EconCoin? *(They were told by you, the teacher, and it’s written on the ledger. That’s all. Could that disappear immediately? Yes. Then how would the student know or be able to prove they owned it? Most modern currency, even our “real” dollars, are digitized these days. This is why bank ledgers are important and consistent checking of accounts matters. Later in the lesson you can point out that our money in banks is insured, cryptocurrency is not.)*
   3. What are you going to do with their EconCoin? *(Honestly, there’s not much they can do with it. If they say they will buy something, ask them who accepts EconCoin as payment. The school? Wal-Mart? Amazon? Nope, none of them. Make sure, however, you drum up excitement. Maybe it will be worth something in the future?)*
6. Announce you have another riddle to solve. Ask your second question. When you get a correct answer – BEFORE you award the EconCoin to the student, ask the second student to verify that the answer given by the first student was actually correct. This can be as simple as stating the first question, the first student’s answer, and asking the second student if this is correct (it will be). Then repeat steps four and five. Verifying the last correct answer is an important step in real-life cryptocurrency mining. You will repeat this process for each correct answer the rest of the simulation.
7. Ask your third question – again making the student who answers correctly verify the answer before them – and record 10 more EconCoin in the block. Do this until you have allocated 50 EconCoin to the class. (While unlikely, it is possible one student could earn ALL 50 EconCoin. If it looks like that is happening, pretend you had a computer glitch or something similar and accept the 2nd or 3rd answer you heard. In addition to distributing EconCoins more broadly – a necessary condition for the second part of the simulation – this ‘error’ also provides an opportunity to discuss the potential problems of relying heavily on computers.).
8. Review the blockchain with the class and ask what has been accomplished so far? *(50 EconCoin have been “created” with correct answers and have been allocated to a few students.)* Explain that this – at a very superficial level – is what happens when a new cryptocurrency is created. In real life the questions are vastly more complicated (the answer to a BitCoin question, for example, is 64 characters long and can be a mixture of letters, numbers, and symbols.) There are several points to tease out of the activity at this stage:
   1. What is EconCoin worth? *(In terms of what? Since it hasn’t been exchanged for anything, it’s maybe not worth anything at all).*
   2. If it’s not worth anything, why are people expending energy shouting out answers to trivia questions? *(Maybe it will be worth something, the opportunity cost of shouting out answers is very low and it’s kind of fun. In real life, this is not the case. Mining Bitcoin, for example, is extremely time consuming and requires massive amounts of computing power. So much so, that people form mining teams of hundreds of computers trying desperately to answer one question! You should also point out here that some students are NOT calling out answers. This is important as well. Not everyone wants EconCoin OR has the knowledge needed to answer the questions correctly to get it. Similarly, most people are not interested in or capable of mining existing cryptocurrencies in the real world.)*
9. Ask if any students in the room would like to just straight up purchase EconCoin at this point using U.S. Dollars. Two scenarios are possible:
   1. If YES, let the students negotiate a price. For reality sake, the student MUST have the money on them in cash. This prevents a ridiculously high price from being set AND allows you to verify they have the money. If an exchange is made (say, $10 for 10 EconCoin) record that on the ledger and announce that it seems the current exchange rate is 1EconCoin to 1USD (or whatever the agreement was). To prevent exchanging real USD, you can substitute fake money here if desired.
   2. If NO, make the point to students that it seems EconCoin is essentially worthless in this classroom.
10. Now hold up something you are willing to sell (preferably something tangible and desirable like a candy bar, T-shirt, pack of markers, homework pass, etc). Announce that you are willing to sell the item for 10 EconCoin – no dollars, you just want EconCoin. By this point there should be enough students with EconCoin to want to buy the item. If not, do another question or two. Make the exchange and point out how now EconCoin has some value. It can be used to buy goods and services from your store.
11. Continue with another round or two of questions and then announce that you are ready to sell a second item, only this time, auction it off in EconCoin. Take the highest bid – remembering to record everything in the blockchain. Point out how the class is still trying to figure out exactly what EconCoin is worth.
12. Ask if anyone would like to buy some EconCoin (with dollars) from the students who have it OR from YOU. Allow them to make any exchanges and record the information in the blockchain. At the very least, sell some of your EconCoin to a couple of students – possibly for very cheap (which should disappoint anyone who bought it earlier). Pause here to discuss the following:
    1. What is the value of EconCoin? *(Unsure, seems to be changing.)*
    2. What is giving EconCoin value? *(How other people view it and if it can be used to purchase goods and services).*
    3. Is EconCoin more or less desirable now than when it started? *(Could go either way depending on the class, but most likely it’s more desirable because you are selling things denominated in EconCoin. You could empirically show this if you asked a polling question early on about how many people wanted EconCoin at the beginning and how many want it now.)*
13. Tell students you are going to release additional EconCoin by posing a few more questions. For the next set of questions, when a student answers correctly, give them **500 EconCoins**. Ask how this makes the other students feel *(ripped off, confused, jealous, mad).* If students ask why you did that, say that as the currency’s creator, it seemed fun, that’s all. What you’re getting at here is the inherent risk and volatility that is predominant in the currency market. While most cryptocurrencies don’t change their supply randomly like this, the variability in supply and unknown dates when new supply will be available can make cryptocurrencies unstable.
14. Continue the simulation at your discretion until time permits or until students start to lose interest (no longer than 20 minutes). You may choose to auction more products, distribute more or less EconCoin or allow more opportunities to purchase EconCoin.

**CLOSURE**

1. Explain that the simulation the students just participated in was designed to get them to understand at a very superficial level how most cryptocurrencies are created and how they get value. They do not all work this way and, as stated earlier, the procedures for how they are actively mined are vastly more complicated. As of July 2021, there were more than 4,000 known cryptocurrencies in various stages of development.
2. Distribute **Handout 1: Cryptocurrency Simulation Debriefing.** Give the students 10 – 12 minutes to answer the questions (with or without a partner at your discretion). Discuss the answers as a class using **Handout 1: Answer Key** for additional talking points. An important point to end on is that, as of now, cryptocurrencies are largely viewed and taxed) as speculative investments. Even the word “currency” is somewhat misleading given the issues surrounding the crypto markets. This lesson provides an excellent transition to discussing the role of the Federal Reserve Bank in managing the money supply of the United States.

**Activity 1: Questions for Currency Mining**

These questions are merely suggestions. Feel free to use them in any order or replace them with your own questions. The specific questions asked have no bearing on the procedures or lesson itself.

1. **What is 21 + 33 + 45 + 8 + 1?**

Answer: 108

1. **In Pokemon, what shape is a male Pikachu’s tail?**

Answer: lightning bolt

1. **What are the first 10 words of the U.S. National Anthem?**

Answer: Oh say can you see, by the dawn’s early light

1. **What is the square root of 64?**

Answer: 8

1. **In the musical Hamilton, which character is introduced in the first song of the second act?**

Answer: Thomas Jefferson

1. **What is 5 to the 3rd power? (53)**

Answer: 125 (5x5x5)

1. **Dover, Augusta, Juneau, and Bismarck are the capitals of which states (in the order listed here).**

Answer: Delaware, Maine, Alaska, North Dakota

1. **List the last four chairs of the Federal Reserve Bank starting with Jerome Powell?**

Answer: Jerome Powell, Janet Yellen, Ben Bernanke, Alan Greenspan

1. **What is 1,024 divided by 20?**

Answer: 51.2

1. **How long (in minutes) is the average Oscar nominated movie?**

Answer: 114 minutes

**Handout 1: Simulation Debriefing Questions**

1. **When the simulation began, what was your interest level in acquiring EconCoin (not at all interested, interested, very interested etc.) and why?**
   1. **Explain how actions or events that occurred during the simulation made you more or less interested in EconCoin during the simulation?**
   2. **If the simulation were to continue, explain why you would or would not want to acquire EconCoin moving forward?**
2. **Complete the chart below with the three basic functions of money, a short description of each, and whether or not EconCoin – based on your experience today – seems to meet that function of money.**

|  |  |  |
| --- | --- | --- |
| Function of Money | Description | How well did EconCoin serve this function? (Explain) |
|  |  |  |
|  |  |  |
|  |  |  |

1. **While this was a simulation of a fictional cryptocurrency, real cryptocurrencies like Bitcoin, Ethereum, Dogecoin, and others have problems similar to the ones you experienced, while also providing exciting possibilities about the future of money. Based on your experience today and our discussions (and any additional research you wish to do), use the back of this page to analyze the role you feel cryptocurrency will play in the future of money and your opinion on whether cryptocurrency is a positive, negative, or neutral force in the world. Be sure to support your statements with specific examples from the simulation or evidence from your research.**

**Handout 1: ANSWER KEY**

1. **When the simulation began, what was your interest level in acquiring EconCoin (not at all interested, interested, very interested etc.) and why?**

*Answers will vary. Likely most students will not have understood what was happening at the beginning and say they had no interest. This is common in real life when new cryptocurrencies are created as well.*

* 1. **Explain how a few actions or events that occurred during the simulation made you more or less interested in EconCoin during the simulation?**

*Answers here will largely depend on what happened during the simulation. Students SHOULD pick up on the fact that when you started accepting it as payment, it was more desirable but as more EconCoin was distributed, the value decreased making it less desirable.*

* 1. **If the simulation were to continue, explain why you would or would not want to acquire EconCoin currently?**

*Answers will largely depend on the outcome of the simulation.*

1. **Complete the chart below with the three basic functions of money, a short description of each, and whether or not EconCoin – based on your experience today – seems to meet that function of money.**

|  |  |  |
| --- | --- | --- |
| Function of Money | Description | How well did EconCoin serve this function? (Explain) |
| Medium of Exchange | Money can be used to purchase goods and services | Not at all at first, then was slowly accepted by ONE seller, but only at certain times. Overall, EconCoin was an ineffective medium of exchange. |
| Store of Value | Money should retain face value over time, even though it’s actual value may fluctuate due to inflation. | While the face value didn’t change, the relative value changed wildly during the simulation. EconCoin was a poor store of value in real terms. |
| Unit of Account | Money should be able to be used to identify value, resolve debts, and make calculations. | EconCoin was a poor unit of account because the value changed rapidly. Even between rounds of selling goods and services the prices fluctuated. |

1. **While this was a simulation of a fictional cryptocurrency, real cryptocurrencies like Bitcoin, Ethereum, Dogecoin, and others have similar problems like the ones you experienced while also providing exciting possibilities about the future of money. Based on your experience today and our discussions (and any additional research you wish to do), use the back of this page to analyze the role you feel cryptocurrency will play in the future of money and your opinion on whether cryptocurrency is a positive, negative, or neutral force in the world. Be sure to support your statements.**

*Real coins like the ones mentioned in this paragraph face the same problems with acceptability, store of value, and speculation. These problems have largely prevented cryptocurrency from going “mainstream.” However, as more and more producers accept them for payment, the likelihood of cryptocurrencies being used as “money” increases.*

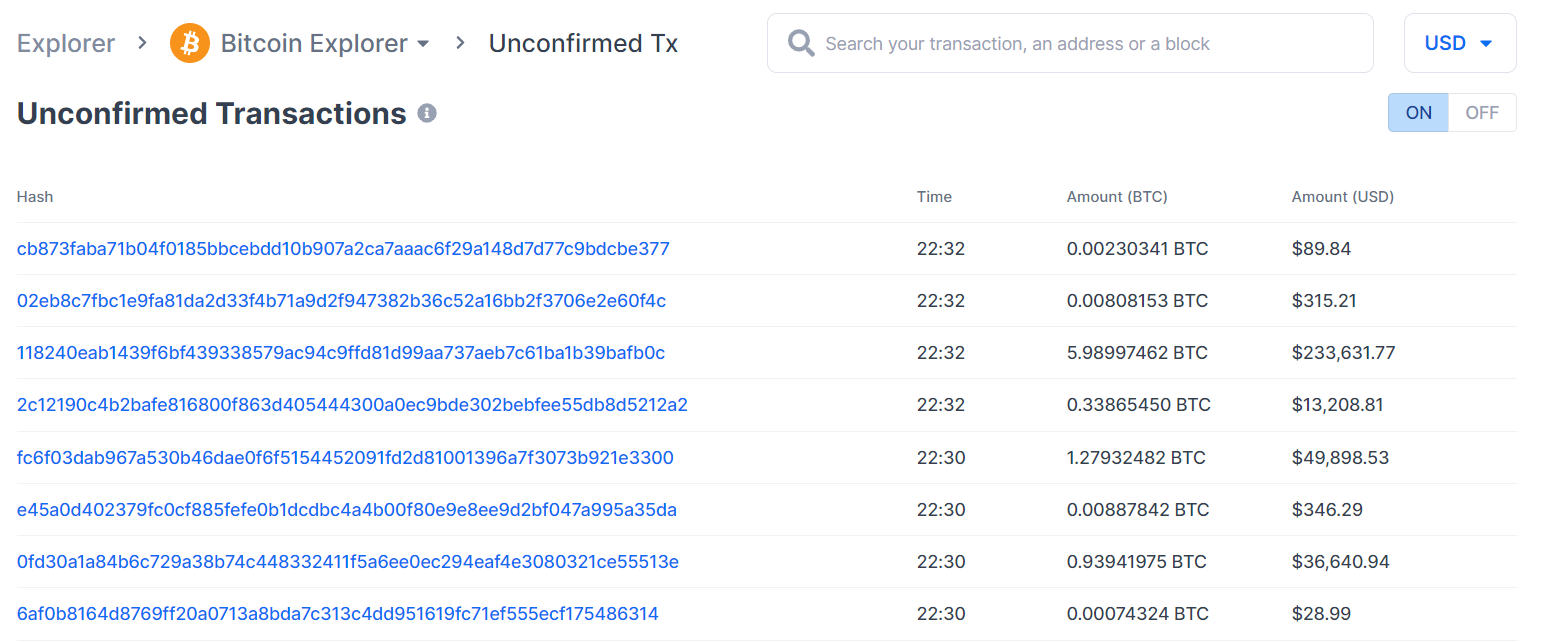
*This lesson heavily focuses on the creation and monetization of cryptocurrencies. There are other issues involving cryptos as well like the pressure these mining computers are putting on networks and power grids resulting in some real environmental concerns and the potential for criminal activity that is exacerbated by these “anonymous” transactions as well as a serious lack of regulations. These concepts are slightly out of the scope of this lesson but may be encountered in online searches by students.*

**SAMPLE “BLOCKCHAIN” LEDGER**

**The ledger below provides a sample of the types of information you should record. It is only a sample and will not reflect your actual transactions. The important point is that you are keeping track of the transactions and everyone else who has EconCoin can also verify these transactions, thus “legitimizing” the currency. In real life, this is done anonymously.**

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| TIME | EVENT | TRANSFER of ECON COIN | TOTAL ECON COIN IN CIRCULATION | NOTES |
| 11:21am | **Correct Answer given: 21** | **10 to Jill S. (Mined)** | **10** | **1st EconCoin distributed!** |
| 11:23am | **Correct answer given: Harry Potter** | **10 to Michelle W. (mined)** | **20** |  |
| 11:26am | **5 EconCoin traded for $1USD** | **5 to Mr. Teacher from Michelle W.** | **20** | **1EconCoin = $.20USD** |
| 11:26am | **“** | **5 to Shauna J. from Michelle W.** | **20** | **1EconCoin = $.20USD** |
| 11:29am | **Correct answer given: 435** | **10 to Chris C. (mined)** | **30** |  |
| 11:33am | **10 EconCoin exchanged for Homework Pass** | **10 to Mr. Teacher from Chris C.** | **30** | **1st exchange for product** |
| 11:35am | **5 EconCoin exchanged for Hershey’s Bar** | **5 to Mr. Teacher from Shauna J.** | **30** |  |

**And, in case you were curious you can follow real blockchain ledgers at blockchain.com (see image below).**

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